

ABSTRACT

A static hydrodynamic mixer undulating interior conduit provides a static mixing apparatus which utilizes a spiral, coiled or curved conduit to cause dynamic mixing of flowing fluids while they are pumped through the conduit. Gentle but pervasive low-shear mixing is produced by axial and radial secondary currents induced by gravitational and centrifugal body forces acting on the solid and liquid fluid components flowing through the undulating conduit. The vigor of mixing and resistance to flow increases with the undulation's amplitude/pitch ratio. The application includes a method of use in extracting bitumen from oil sands.